18th International Conference on Knowledge-Based and Intelligent Information & Engineering Systems - KES2014

An e-portfolio system that enables cooperation between institutes

Yoshimitsu Miyasawa*, Yoshi Fukuura, Takashi Yukawa
Nagaoka University of Technology, 1603-1 Kamitomioka, Nagaoka, Niigata 940-2188 Japan

Abstract

In this study, we propose an e-portfolio system for analyzing and managing educational data from Institute of National Colleges of Technology and Nagaoka University of Technology. We detail the e-portfolio system introduced at Nagaoka University of Technology; in particular, we formulated specifications for each department of Nagaoka University of Technology. Next we designed a display screen based on these specifications, focusing on two key functions. First, the personal information display function searches for and displays information about the students matching the specified. Second, the statistical information display function displays the outcome of statistical analysis and a graphical representation of student information. In this paper, we show each of these display screens. In the future, we will integrate actual data into the system and start formal operation.

© 2014 The Authors. Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/3.0/).

Keywords: e-portfolio; information distribution

1. Introduction

In Japan, Nagaoka University of Technology, Toyohashi University of Technology, and Institute of National Colleges of Technology are promoting education reform to train technical personnel in order to support the globalization of industry, however, referencing student learning histories across each educational institution is impossible because each educational institution manages its own educational data. For example, for Toyohashi University of Technology and Nagaoka University of Technology to reference the academic performance of student at Institute of National Colleges of Technology is impossible. Further, referencing educational data across each major is impossible because each major also manages its own educational data. Nonetheless, it is necessary for Toyohashi University of Technology and Nagaoka University of Technology to reference the academic performance of student at Institute of National Colleges of Technology because the number of students attending college is large.

To this end, we propose the use of an e-portfolio system; such system have recently attracted attention as an effective mechanism for sharing educational data and learning histories in the field of education. Many e-portfolio systems have been developed in support of education1,2,3,4,5,6,7, however, to date, e-portfolio systems have not been

* Corresponding author. Tel.: +81-258-47-1611 (ex. 9901).
E-mail address: miyasawa@vos.nagaokaut.ac.jp.
intended for data management across individual institutes. Managing student learning histories after admission, before enrollment, and after graduation is important.

We have therefore developed an e-portfolio system for cooperation between individual institutes. This system promotes the use of learning life-logs by managing educational and employment data from colleges and technical colleges. In particular, we describe the e-portfolio system introduced at Nagaoka University of Technology. This e-portfolio system is able to manage learning histories after admission, before enrollment, and after graduation. In addition, it can be used for support the educational strategies of a university.

We designed display screens for the system based on specifications formulated for each major at Nagaoka University of Technology. Our system has two key functions. First the personal information display function searches for and displays the information about students matching the specified criteria. Second, the statistical information display function displays the outcome of statistical analysis and a graphical representation of student information.

In this paper, we describe and show each of these display screens.

2. Educational institutions

In this section, we introduce Nagaoka University of Technology and Institute of National Colleges of Technology, focusing on the need to manage academic performance at a technical college.

Institute of National Colleges of Technology is aimed at improving the level of technical expertise in Japan and training personnel with professional knowledge and practical skills necessary for employment. To this end, it is an organization focused on the establishment and management of a technical college.

Nagaoka University of Technology created "GIGAKU" to anticipate changes in society. This university was established based on the principle of training leading engineers with aspirations of service and creative ability to contribute to future society. The maximum capacity of enrollment is 80 for one-year enrollment and 310 for three-year enrollment. In the master’s program, maximum enrollment is 419, and in the doctoral program, maximum enrollment is 40.

Some students who graduate from technical college enroll at Nagaoka University of Technology as third-year enrollees. Therefore, the university teachers of Nagaoka University of Technology visit technical colleges and introduce the university to students. In addition, there are educational activities to experience the workplace over the last few months in the fourth year. This educational activity is called in-service training.

In this paper, we introduce an e-portfolio system introduced at Nagaoka University of Technology.

3. Specification of the display screens

We gathered opinions regarding those outcomes of statistical analysis that were important for each department of Nagaoka University of Technology. We formulated specifications after summarizing these opinions, our specifications are shown in Table 1.

We designed display screens based on there specifications, i.e., the display screens of our e-portfolio system are based on Table 1.

4. Cooperation between institutes via an e-portfolio system

4.1. System configuration

Figure 1 shows the system configuration of the e-portfolio system introduced at Nagaoka University of Technology. Basic information regarding students is added and edited using the already existing academic affairs and admission systems. The academic affairs system manages student information, such as student ID numbers, names, curriculum and academic performance data, and so on. A substantial amount of information regarding students is stored in the databases of the existing system. This information and academic performance in technical colleges are converted and integrated for input into the e-portfolio database. Users can view summary information and visualize the data using a web browser.
Table 1. Display screen specifications

<table>
<thead>
<tr>
<th>User</th>
<th>Uses</th>
<th>No</th>
<th>Display items</th>
</tr>
</thead>
<tbody>
<tr>
<td>College</td>
<td>Admission</td>
<td>1</td>
<td>Distribution of rank scores of each type of admission</td>
</tr>
<tr>
<td></td>
<td>Scholarship reform</td>
<td>2</td>
<td>Distribution of rank scores of each type of scholarship</td>
</tr>
<tr>
<td></td>
<td>Admission selection</td>
<td>3</td>
<td>Former high schools/Distribution of rank scores of each department</td>
</tr>
<tr>
<td></td>
<td>Curriculum revision/FD</td>
<td>4</td>
<td>Correlation between scores at old schools and undergraduates</td>
</tr>
<tr>
<td></td>
<td>Curriculum revision/FD</td>
<td>5</td>
<td>Relationship between the department and former high schools of dropouts, temporary absences and holdovers</td>
</tr>
<tr>
<td></td>
<td>Scholarship reform</td>
<td>6</td>
<td>Analysis of low and high achievers</td>
</tr>
<tr>
<td></td>
<td>Curriculum revision/FD</td>
<td>7</td>
<td>Relationship between undergraduate and graduate results</td>
</tr>
<tr>
<td></td>
<td>Curriculum revision/FD</td>
<td>8</td>
<td>Academic performance distributions of each subject</td>
</tr>
<tr>
<td></td>
<td>Curriculum revision/FD</td>
<td>9</td>
<td>Total units earned by general students/dropouts/absences from school, holdovers</td>
</tr>
<tr>
<td></td>
<td>Deterrence of dropouts/absences from school, holdovers</td>
<td>10</td>
<td>Record of academic performance for the deterrence of dropouts, absences from school, holdovers</td>
</tr>
<tr>
<td></td>
<td>Career design</td>
<td>11</td>
<td>Relationship between courses and employment fields</td>
</tr>
<tr>
<td></td>
<td>Visit technical colleges</td>
<td>12</td>
<td>Company's name of in-service training</td>
</tr>
<tr>
<td></td>
<td>Curriculum revision</td>
<td>13</td>
<td>Titles of bachelor's thesises</td>
</tr>
<tr>
<td></td>
<td>Curriculum revision</td>
<td>14</td>
<td>Titles of master's theses, the chief examiner and vice-chairman</td>
</tr>
<tr>
<td></td>
<td>Curriculum revision</td>
<td>15</td>
<td>Company in students enter</td>
</tr>
<tr>
<td>Chief major</td>
<td>Curriculum revision</td>
<td>16</td>
<td>Academic performance distribution of each subject</td>
</tr>
<tr>
<td></td>
<td>Compare</td>
<td>17</td>
<td>Academic performance of the old school</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18</td>
<td>Academic performance at university entry</td>
</tr>
<tr>
<td>Class teacher</td>
<td>Student advising</td>
<td>19</td>
<td>Status of the achievement of educational goals</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td>Academic performance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>21</td>
<td>Attendance of learning support</td>
</tr>
<tr>
<td></td>
<td></td>
<td>22</td>
<td>Total units earned by general students, dropouts, absences from school, holdovers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>23</td>
<td>History of crossing/in-service training, academic exchange, international conference</td>
</tr>
<tr>
<td>Adviser</td>
<td>Efficacy of learning support system</td>
<td>24</td>
<td>Academic performance at old school</td>
</tr>
<tr>
<td></td>
<td>Coaching for practice teaching</td>
<td>25</td>
<td>Course record for teaching subjects</td>
</tr>
<tr>
<td></td>
<td>Parents’ evening</td>
<td>26</td>
<td>Record of academic performance</td>
</tr>
<tr>
<td>Teaching job</td>
<td>Lesson plan</td>
<td>27</td>
<td>Academic performance at old school</td>
</tr>
<tr>
<td></td>
<td>Lesson plan</td>
<td>28</td>
<td>Academic performance at old school</td>
</tr>
<tr>
<td></td>
<td>Curriculum revision and faculty development</td>
<td>29</td>
<td>Academic performance distribution of each subject</td>
</tr>
</tbody>
</table>

Our system has two key functions. First, the personal information display function searches for and displays the information about students matching the specified criteria results. Second, the statistical information display function displays the outcome of statistical analysis and a graphical representation of student information.

4.2. Personal information display function

The personal information display function searches for student information that matches the specified criteria, displaying the resulting student information on the screen. Using this function, users can search for students based on a name, student ID number, admission year, faculty and graduate courses, students courses and majors, grades, enrollment situations, scholarship student classifications, and previous schools. Students who match the specified criteria are displayed in a list at the bottom of the screen. This list shows student ID numbers, names, affiliations, grades, enrollment situations, and previous schools. When a student’s name is clicked, more detailed information regrad-
academic affairs system
Admission system
Many database

Existing System / Database

Online
Convert / Integration
Convert / Integration2

E-Portfolio DataBase

Web browser
Summary / Visualization
- the personal information display function
- the statistical information display function

Fig. 1. System configuration

Academic performance in technical college

technical college A

unified data format

technical college B

Academic performance in technical college

ing the selected students is display, as illustrated in Figure 2. Such information includes name, a photograph of the student’s face, previous school information. In this screen, student information is divided into the following three section. School registration information, a list of subjects, and current academic performance. School registration information shows personal information, guarantor information, parent information, and enrollment information etc. The list of subjects shows interim registration information as well as current registration information. Current academic performance shows results of a student’s academic performance, including the subjects studied, school credited etc.

The functions above satisfy items 9, 10, 19, 20, 22, 24, 25, 26, 27, and 28 from Table1.

4.3. Statistical information display function

The statistical information display function displays the outcome of statistical analysis and a graphical representation of student information.

Figure 3 shows a screenshot of the academic performance distribution of each admission type. The horizontal axis is the score range and the vertical axis is the number of item. The screen in the figure corresponds to item 1 in Table1. More specifically, this screen is used for the entrance examination system reform because the screen shows comparison of scholarship and general entrance examination by the academic performance of each grade. In addition, when the user moves the mouse over points shown on the graph, the corresponding student data is displayed on the screen. This function is implemented for each display function.

Figure 4 shows a screenshot of the academic performance distribution of a major and a previous school. The horizontal axis represents placement test scores and the vertical axis represents the deviation of the recommendation ranking for postgraduates. The screen in the figure corresponds to the item 3 Table1. This screen is used to visit technical college and reflect in admission selections and it enables users to compare placement test scores with the deviations of recommendation ranking across previous schools.
Figure 5 shows a screenshot of a correlation of results or undergraduates and postgraduates. The horizontal axis represents the deviation of recommendation ranking for postgraduates and the vertical axis represents their thesis score. The screen in the figure corresponds to the item 7 of Table 1. This screen is used for curriculum revision and faculty development because it shows the relationship between undergraduate and graduate results.

Figure 6 shows a screenshot of the academic performance distributions for each subject. The horizontal axis represents the score range and the vertical axis represents the number of people. The screen in the figure corresponds to items 8, 16, and 29 of Table 1. This screen is used for curriculum revision and faculty development because it shows the academic performance distribution for each subject.

5. Conclusion

In this paper, we described an agency cooperation-based learning e-portfolio system introduced at Nagaoka University of Technology.

We developed this e-portfolio system to enable cooperation between institutes. This system promotes the use of learning life-logs by managing educational and employment data from colleges and technical colleges. Our e-portfolio system is able to manage learning histories after admission, before enrollment, and after graduation. Therefore our e-portfolio system is best used in support of educational strategizing in the university.

After formulating the specifications for each department at Nagaoka University of Technology, we designed display screens for the system based on these specifications. As illustrated in this paper, our system has two key functions. First, an individual student information display function searches for the students and displays student information in an interactive interface. Second, a statistical information display function visualizes statistics for users. In this paper, we showed these display items via example uses of the system.
Fig. 3. A screenshot showing academic performance distribution for admission types

Fig. 4. A screenshot showing academic performance distribution of majors and previous school

Acknowledgements

We thank Prof. Bumpei Nakade, Vice President of Nagaoka University of Technology, Mr. Akihiro Watanabe, Manager of the Academic Affairs Division of Nagaoka University of Technology, and Mr. Osamu Hotta.
Fig. 5. A screenshot shows a correlation of results of undergraduate and postgraduate

Fig. 6. A screenshot showing academic performance distributions for each subject

References